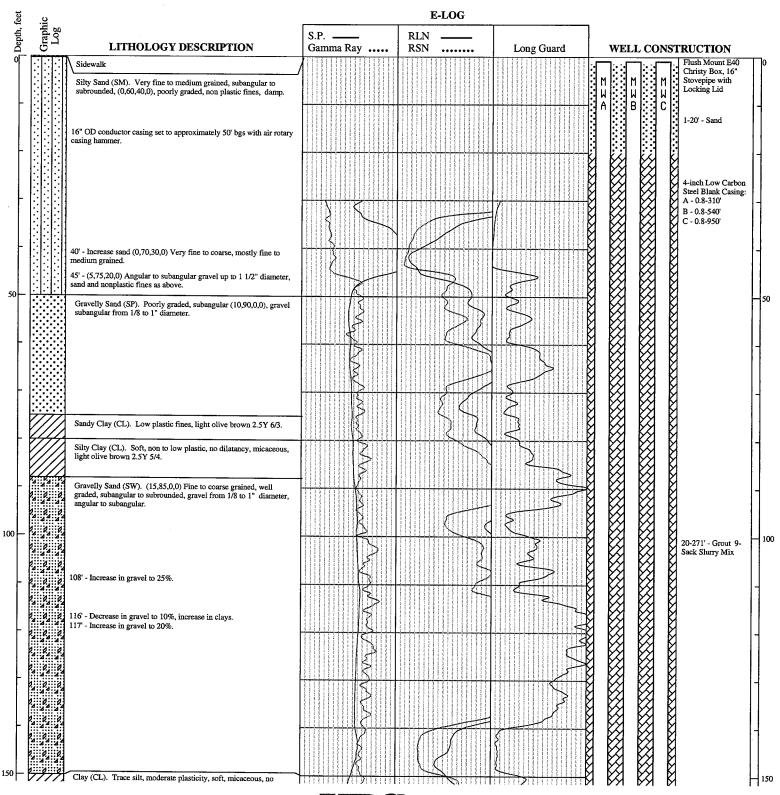
Project: Muscoy RA Location: San Bernardino, CA Project Number: 18600069.06010		Log of Monitoring Wells: MW-138A, MW-138B, MW-138C	
Dates Drilled: 2/23/02 - 3/3/02	Total Depth Drilled: 1000 feet		Logged By: M.Hogaboom, V.Elarth
Drilling Contractor: Water Development Corp	Borehole Diameter: 14 1/2-inch		Checked By: DLB
Drill Rig Type Dresser T70W	Well Construction Dates: 3/4/01 - 3/7/0	2	Screen Slot Size: 0.020-inch
Drilling Method: Reverse Circulation Mud Rotary	Well Diameter: 4-inch		
Drill Bit: 10 5/8 and 14 1/2-inch Clay Bit	Well Casing: Low Carbon and Stainless S	teel	
Comments:			



Project: Muscoy RA Log of Monitoring Wells: MW-138A, MW-138B, MW-138C Location: San Bernardino, CA Project Number: 18600069.06010 E-LOG Graphic Log S.P. RLN LITHOLOGY DESCRIPTION Gamma Ray ... **RSN** Long Guard WELL CONSTRUCTION dilatance, light vellowish brown 2.5Y 6/3 Gravelly Sand (SW). (10,90,0,0) Well graded, fine to coarse grained, subangular to subrounded sand, quartz, feldspar, mafics ock frags, gravel predominantly fine with traces of coarse up to 1 1/2", angular to subrounded. Silty Clay (CL). Soft, low plasticity, micaceous, trace fine sand, no dilatance, light olive brown 2.5Y 5/4. Gravelly Sand (SW). (10,90,0,0) Well graded, fine to coarse grained sand, subangular to subrounded, quartz, feldspar, mafics, rock frags, gravel predominantly fine with traces of coarse up to 1 1/2", angular to subrounded. 175' - Increase in gravel size. 178' - Increase gravel to 15%, much rig chatter, hard drilling. Clay (CL). Soft to medium stiff, moderate plasticity, micaceous, can roll to 1/8", trace silt, light olive brown 2.5Y 5/3. Gravelly Sand (SW). (20,80,0,0) Well graded, fine to coarse grained sand, subangular to subrounded, quartz, feldspar, mafics, rock frags, gravel predominantly fine with traces of coarse up to 1 200 200 Clay (CL). Soft to medium stiff, low plasticity, no dilatance, micaceous, grayish brown 2.5Y 5/2 with orange mottling. 210' - Increase in stiffness, low plastic, color change to light olive Sand (SP). Poorly graded, fine to coarse grained, predominantly medium sand, trace fine gravel, subangular to subrounded. Silty Clay (CL). Medium stiff, low plasticity, micaceous, light olive brown 2.5Y 5/4. Gravelly Sand (SW-GW). (25,75,0,0) Well graded, fine to coarse grained, subangular to subrounded sand, quartz, feldspar, mafics, rock frags, gravel up to 1 1/2" diameter, angular to subangular. Silty Clay (CL). Low plastic, soft to medium stiff, micaceous, pale brown 10YR 6/3. Gravelly Sand (SW-GW). (20,80,0,0) Well graded, fine to coarse grained, subangular to subrounded, gravel fine grained to 3/4" dia. 250 254 - Increase in gravel size. Silty Clay (CL). Medium stiff, non to low plastic, no dilatance, micaceous, very dark grayish brown 2.5Y 3/2. Gravelly Sand (SW-GW). (10,90,0,0) Well graded, subangular to subrounded, fine to coarse grained, gravel fine to 1/2" diameter. Silty Clay (CL). Trace sand, non to low plastic, medium stiff, micaceous, light olive brown 2.5Y 5/4. Gravelly Sand (SW). Well graded, subangular to subrounded, fine to coarse grained, gravel to 1" diameter. 271-290' 1:1 Bentonite - Sand Seal 290' - Decrease in gravel size. "Cemented", slow drilling. 290-310 Transition 300 #0/30 Sand 300° - (20,80,0,0) Gravel increase to 20%, angular to subrounded. 300 305' - "Cemented", gravels decreased to 15%, decrease in size to fine. 310' - Hard drilling rig chatter, slight increase in gravel size. 4-inch Stainless Steel Blank Casing with Di-electric Coupler 310-320' 315' - Increase rig chatter.



320-340' 4-inch Stainless Steel, .020-inch Slot Continuous Wire Wrap Screen, Filter Pack #3 Sand 310-351'

320' - Sand with Gravel (5,95,0,0) Well graded, fine to coarse grained, subangular to subrounded, gravel fine up to 1/2". Gravels increasing with depth to 15% and up to 1" diameter.

332' - Increase gravel size (>1"), much rig chatter, hard drilling,

Project: Muscoy RA Log of Monitoring Wells: MW-138A, MW-138B, MW-138C Location: San Bernardino, CA Project Number: 18600069.06010 E-LOG Graphic Log S.P. RLN LITHOLOGY DESCRIPTION Gamma Ray RSN Long Guard WELL CONSTRUCTION 2 22 22 "drilling through large cobbles - water bearing zone" 340' - Gravelly Sand (SW-GW). (20,80,0,0). 350 350 0 0 0 4 4 4 Silty Clay (CL). Medium stiff, moderate plasticity, micaceous, dark grayish brown 2.5Y 4/2. Gravelly Sand lense. Silty Clay (CL). Non to low plastic, soft to medium stiff, very dark grayish brown 2.5Y 3/2. Alternating layers gravelly sands and clays 380-400'. 400 Sand (SP). Trace gravel (5,95,0,0) and wood fragments, poorly graded, fine to coarse grained, predominantly medium grained, 351-492' - Grout 9-Sack Slurry Mix subangular to subrounded. Silty Clay (CL). Soft, non plastic, micaceous, olive gray 5Y 4/2 Sand (SP). Trace gravel (5,95,0,0) poorly graded, fine to coarse grained, predominantly medium, subangular to subrounded, gravel Silty Clay (CL). Non plastic, stiff, very dark gray 2.5Y 3/1 with dark gray mottling 5Y 4/1. Gravelly Sand (SW-GW). (15,85,0,0) Well graded, fine to coarse grained, subangular to subrounded, quartz, feldspar, mafics. Gravel from fine to 1 3/4" diameter, predominantly fine (1/2" or less), slight odor, much rig chatter. At 440' - Decrease in gravels to 10% size ranging from fine to 1" diameter. 450 449' - Gravel decreases in size to 1/2" or less. 456' - Increase in gravels to 15%. 460' - Sand with Gravel (5,95,0,0) slight odor in shaker bin, rig chatter, difficult drilling (cobbles). 470' - Increase in gravels to 15%. 475' - Decrease in gravels to trace. 480' - Sand with Gravel (5,95,0,0) minor fine gravels. 500 500 492-519' 1:1 Silty Clay (CL). Soft, low plasticity, micaceous, dark gray 5Y 4/1. Bentonite - Sand Seal 514' - Sand lense. 2870 Gateway Oaks Dr., Ste 300

Sacramento, CA 95833

Project: Muscoy RA Log of Monitoring Wells: MW-138A, MW-138B, MW-138C Location: San Bernardino, CA Project Number: 18600069.06010 E-LOG S.P. **RLN** LITHOLOGY DESCRIPTION Gamma Ray **RSN** Long Guard WELL CONSTRUCTION 520' - Silty Clay with trace wood, medium stiff, low to moderate plasticity. 519-539' Transition Sand Bridge #0/30 Sand 4-inch Stainless Sand (SP). Poorly graded, fine to coarse grained, predominantly fine to medium, subangular to subrounded, silts. At 545' - Increase Steel Blank Casing with Di-electric grain size. Coupler 540-550' 548' - Fine gravels to 10% with medium and coarse grained sand. 550 550 552' - Increase in fines, fine gravels to 5%. 550-570' 4-inch Stainless Steel, .020-inch Slot 557' - Small clay lense, return to medium to coarse sand with trace fine gravel. Continuous Wire Wrap Screen, Filter Pack #3 Sand 539-582' 560° - Sand with 5% gravel, predominantly medium sand with fine gravel, poorly graded, hard drilling. 565' - Increased fines, trace fine gravel. 568' - Increase grain size to medium to coarse with 10% fine gravels. 572' - Increase fines, trace gravel.
575' - Gravelly Sand lense, moderately graded, fine sand to coarse gravel up to 1". Fines increase and gravels from 25% to trace. Silty Clay (CL). Medium stiff, low to moderate plasticity, dark olive gray $5Y\ 3/2$. 580' - Color change to light olive brown 2.5Y 5/4. 593' - Decrease in clay, increasing fines. Sand (SP). Poorly graded, fine to coarse grained, predominantly medium, subangular to subrounded, fines 600 ഹാ 600' - Grainsize increase to include 5% fine gravel. 612' - " Rig Chatter " Silty Clay (CL). Medium stiff, low plasticity, micaceous, light olive brown 2.5Y 5/4 - lense. Silty Sand (SM-SP). (5,70,25,0) Non plastic fines, light yellowish brown 10YR 6/4 (silt balls) with fine to coarse grained sand, predominantly medium, subangular to subrounded, 5% fine gravel, subangular. Gravelly Sand (SW). (15,80,0,5) Well graded, fine to coarse grained, subangular to subrounded, gravel fine to coarse up to 1 1/2" diameter, predominantly fine to 3/4", subangular to subrounded, trace clay. 650' - Decrease in gravel to 5-10% and size to fines 1/2" or less. 582-890' - Grout 9-Sack Slurry Mix Sandy Clay with Silt (CL-ML). Stiff, low plasticity, fine grained sand, micaceous, yellowish brown 10YR 5/4. 660' - Sand lense. Alternating sand and clay layers between 660 -680' - 1 to 3' sand layer then return to sandy clay with silt. Continue alternating layers sand with trace fine gravel, predominantly clay

650

Project: Muscoy RA Log of Monitoring Wells: MW-138A, MW-138B, MW-138C Location: San Bernardino, CA Project Number: 18600069.06010 E-LOG S.P. RLN Gamma Ray LITHOLOGY DESCRIPTION RSN Long Guard WELL CONSTRUCTION Sand (SW). Well graded, fine to coarse grained, angular to subrounded, 5% fine gravel. Silty Clay (CL). Stiff, low plasticity, light olive brown 2.5Y 5/3. Sand (SW). Well graded, fine to coarse grained, angular to subrounded, 5% fine gravel. Alternating layers SW/CL. Silty Clay (CL). Non to low plasticity, medium stiff, micaceous, light olive brown 2.5Y 5/3. Intermixed silts and fine sands. 740° - Sandy Clay with Silt, low plasticity, medium stiff, micaceous, light olive brown 2.5Y 5/3. Slow drilling. 750 750 753' - Fines with medium sands - lense. 760 - 780' Missed sample. 780° - Silty Clay, soft to medium stiff, moderate plasticity, dark grayish brown 2.5Y 4/2 and dark gray 2.5Y 4/1. Gravelly Sand (SW-GW). (15,85,0,0) Well graded, fine to coarse grained, subangular to subrounded with gravel up to 1" diameter, predominantly fine. Clay with Silt (CL). Stiff, moderate plasticity, gray 2.5Y 5/1 with 800 800 816 - Decrease clays, increase silts and fine sand. Silty clay with sands increasing. 820' - Gradational change to (GC-SC) sandy clay/gravelly clay with silts, fine to coarse sands with fine gravel within clay layer. 830' - Decreasing clays, increasing fines, trace sand. 833' - Returned to clay with silt. 840° - Sandy Clay with Silt, medium stiff, moderate plasticity, fine sand, trace silt, very dark gray 2.5Y 3/1. 850 850 855' - Increase in sands/fines. 857' - Increase in clay, no visible sands. 860' - Sandy Clay with Silt (CL), soft to medium stiff, moderate plasticity, very fine sand, very dark gray 2.5Y 3/1. 880' - Clay with silt (CL), very stiff, dark gray 5Y 4/1. 2870 Gateway Oaks Dr., Ste 300 Sacramento, CA 95833 916-679-2000

MW-138A, MW-138B, MW-138C Location: San Bernardino, CA Project Number: 18600069.06010 Graphic Log S.P. RLN LITHOLOGY DESCRIPTION Gamma Ray **RSN** Long Guard WELL CONSTRUCTION Gravelly Sand (GP-SW). Well graded, fine to coarse grained, subrounded to subangular with fine gravel to 1/2", angular to **4**0 subangular. 890-924' 1:1 Bentonite - Sand Clay (CL). Very stiff, dark gray 5Y 4/1. 900 Seal 900 900' - Gravelly Sand lense transitioning to clay. Alternating layers. 910-913' Sand lense (SW). Trace fine gravels, increasing clays. Continue alternating SW/CL layers. 920' - Silty Clay, trace fine sand, medium stiff, low to medium platicity, micaceous, dark gray 2.5Y 4/1. 924-942' Transition #0/30 Sand 937' - Clays decrease, sand present. Gravelly Sand (SW). (10,90,0,0) Well graded, fine to coarse grained, subangular to subrounded, fine gravel to 1/2", angular to subangular. 950 950' - Increase in gravels to 15%. 950 4-inch Stainless Steel Blank Casing 952' - Clay lense. with Di-electric Coupler 950-960' 960' - Gravelly Sand (SW-GP). (25,75,0,0) Well graded, fine to coarse grained, subangular to subrounded, gravels to 1/2°, angular to subangular. "Drilling like we're in stone cobbles bigger than bit" per 960-980' 4-inch Stainless Steel, .020-inch Slot Continuous Wire Wrap Screen, Filter Pack #3 Sand 942-985' 972' - Decrease in gravels to 15%. 978' - Clay lense. 980' - Gravelly Sand (SW-GP). (25,75,0,0) Well graded, fine to coarse grained, subangular to subrounded, gravels to 1/2", angular to Clay with Silt (CL). Medium stiff, moderate plasticity, gley, greenish gray 5GY 5/1. 985-1000' - Natural 1000° - Sandy Clay with silt, soft, low plasticity, fine sand, micaceous dark gray 5Y 4/1.

Log of Monitoring Wells:

Project: Muscoy RA